

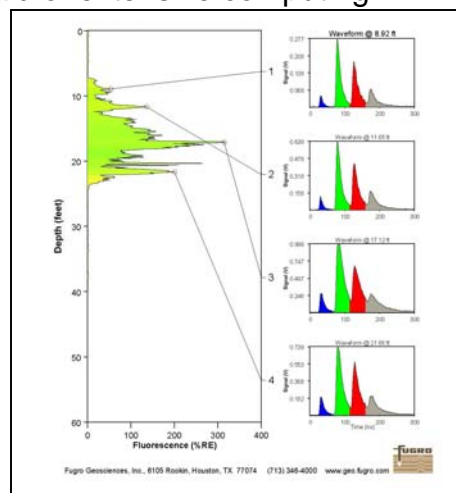
An Ostrich Eye View: Looking Below the Surface

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The former Total Petroleum Inc. (TPI) refinery in Arkansas City operated from 1920 until 1996. During the refinery's operation, soil and groundwater were contaminated with petroleum and various metals. TPI has been investigating site-wide surface and sub-surface soil contamination. Cone Penetrometer Technology (CPT) combined with a Rapid Optical Screening Tool (ROST) were used to delineate the petroleum contamination. While the former technology (CPT) determines soil texture, the latter technology (ROST) measures petroleum contamination. With the aid of extensive computing power, the unsaturated zone petroleum contamination at the facility was delineated.

TPI used a hydraulically operated direct push machine equipped with CPT/ROST sensors to determine soil texture and petroleum contaminants in 2 cm increments. Soil from the entire site was sampled on 200-foot horizontal grid centers. The results yielded a two-dimensional representation of the soil profile and petroleum contamination at each sample point (Photo 1 at right).

The major advantages of CPT/ROST sensing are: results are displayed in real time, and the method is faster and more cost effective than traditional soil boring and laboratory sample analysis. In addition, soil is minimally disturbed, so, volatile components are not lost to the atmosphere. There is also a greater degree of accuracy with this method as depth is measured in 2 cm increments. Since drill cuttings are not generated, waste generation is minimized. Disadvantages are: high mobilization costs, difficulty of maneuvering in limited spaces (Photo 2 at left) and ROST analysis is not specific to individual petroleum constituents.



Data generated using CPT and ROST is assisting TPI to generate a complete view of the subsurface contamination at this site. Putting all the information together, a three dimensional (3-D) map of the site's petroleum contamination may be possible. A 3-D map may allow the facility to confidently focus on appropriate remediation methods at the most contaminated areas. The results of the CPT and ROST technology may enable TPI to complete the site investigation in record time. Data generated from this investigation is expected to assist TPI to complete risk screening as well. Using this data, with previous well data, will make remediation decision-making easier, resulting in better risk management at this site.